



US009727193B2

(12) **United States Patent**  
**Chang et al.**

(10) **Patent No.:** **US 9,727,193 B2**  
(45) **Date of Patent:** **\*Aug. 8, 2017**

(54) **INTEGRATED TOUCH SCREENS**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 188 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/838,234**

(22) Filed: **Aug. 27, 2015**

(65) **Prior Publication Data**

US 2015/0370378 A1 Dec. 24, 2015

**Related U.S. Application Data**

(60) Continuation of application No. 14/666,174, filed on Mar. 23, 2015, now Pat. No. 9,146,414, which is a (Continued)

(51) **Int. Cl.**

**G06F 3/041** (2006.01)

**G06F 3/044** (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC ..... **G06F 3/044** (2013.01); **G02F 1/1368** (2013.01); **G02F 1/13306** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC ..... **G06F 3/041**

See application file for complete search history.

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**ABSTRACT**

Integrated touch screens are provided including drive lines formed of grouped-together circuit elements of a thin film transistor layer and sense lines formed between a color filter layer and a material layer that modifies or generates light. The common electrodes (Vcom) in the TFT layer can be grouped together during a touch sensing operation to form drive lines. Sense lines can be formed on an underside of a color filter glass, and a liquid crystal region can be disposed between the color filter glass and the TFT layer. Placing the sense lines on the underside of the color filter glass, i.e., within the display pixel cell, can provide a benefit of allowing the color filter glass to be thinned after the pixel cells have been assembled, for example.

**21 Claims, 16 Drawing Sheets**

